CEMENT MILL SECTION of

Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of portland cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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Bulk Cement Railway Hopper Cars Unloaded by Gravity

Seven Railways Place Converted Coal Cars at Disposal of Cement Industry—Low Cost of Unloading Is Feature—Only One Man Required

RAILWAY hopper cars that unload by gravity, designed for the shipment, in bulk, of cement and similar commodities, have been placed into service by no less than seven eastern railways in recent months. These include the Lehigh Valley, the Pennsylvania, the Baltimore and Ohio, the Lehigh & New England, the Reading, the Delaware, Lackawanna & Western, and the Jersey Central.

There is some variation in the capacity of the cars, which ranges from 50 to more than 60 tons (265 to 325 bbl.) but in construction the cars are quite similar, varying only in unimportant details.

Are Converted Coal Cars

These cars, in fact, are converted hopper cars formerly employed in shipping coal. The addition of a watertight roof, the construction of a transverse bulkhead at the center, the installation of four hopper outlets fitted with slide gates, and the addition of accessory fittings, constitute about the only alterations required. It is said that the average cost of refitting a coal car for this purpose is not much in excess of $500.

Figure 1 shows one of the cars put into service by the Lehigh Valley railway. This illustration shows clearly the discharge hoppers underneath, while the cover over one of the eight hatches in the roof is in the open position.

Unloading Equipment Required

The equipment required by the purchaser of cement to enable him to receive bulk shipments is essentially the same as in any set-up for receiving cement in bulk. In the most simple arrangement a screw conveyor is placed under the rails, space for the conveyor being provided by separating two of the track ties somewhat more than the usual distance, and excavating a small amount between ties. The screw conveyor must, of course, be long enough to reach from the outside rail to the boot of the bucket elevator, or to whatever facilities the purchaser has for filling his bulk cement bins.

Good results are being obtained where the screw conveyor has an 8-in. flight for the length directly beneath the hoppers, and a 10-in. flight from that point to its discharge point. In this way the 8-in. screw runs full and acts as a feeder; but the instant the cement enters the 10-in. flight the screw is no longer full and the cement coasts along easily to the discharge point, without danger of plugging the screw.

The Unloading Operation

After a car has been spotted so that two of the four hopper outlets are directly over the screw conveyor, a storm cover that affords protection from rain and dirt is raised and held in position by a steel catch attached to the side of the hopper. The seal is then broken and a locking pall is turned, releasing the sliding gate, which is then pulled out about 6 in. by means of a specially designed bar or tool shown in use in Figure 2. The discharge opening is about 12 by 24 in. in size, but the usual practice in unloading is to open the sliding gate about 6 in. at the start, gradually increasing the opening as the head of the cement is reduced.

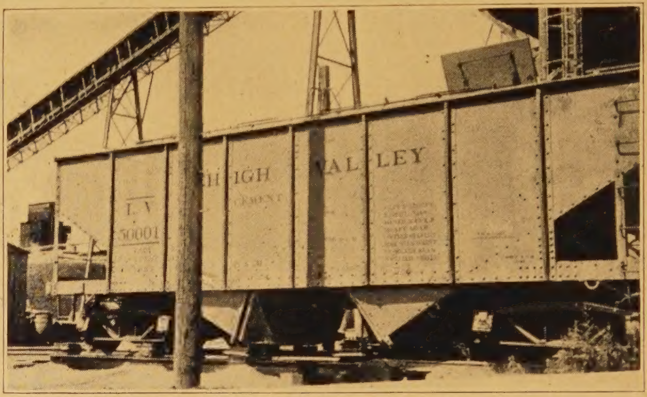


Figure 1. One of bulk cement cars of Lehigh Valley Railway. Cement is unloaded by gravity

After half the car is unloaded the storm cover connections are removed from the hoppers, the car is pinched ahead so as to spot the second pair of hoppers for the final unloading. Detaching the storm covers, moving the car, and reattaching the covers is an operation that may require from 10 to 15 minutes. When the car is being spotted it is well to have a second man present to signal

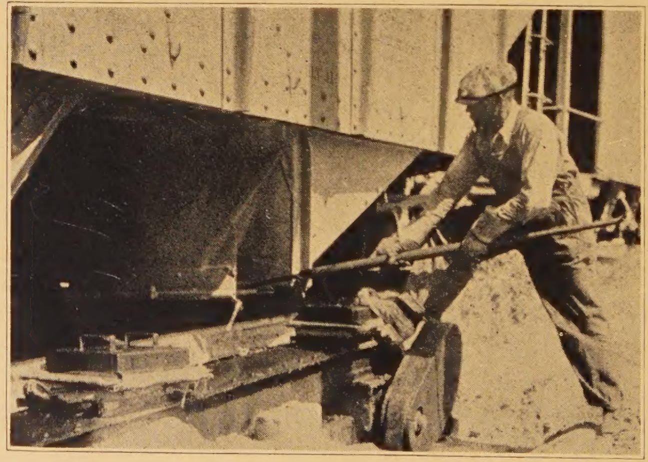


Figure 2. Opening sliding gate to start unloading

the regular operator when the car is spotted correctly. Aside from this, one man can attend to the unloading.

The necessity for re-spotting a car is avoided where a track hopper with an opening not less than 5 ft. wide is provided, the 5-ft. dimension being lengthwise of the track.

Starting the Flow of Cement

When a shipment has come a long distance the cement may be packed, and the flow will not start without assistance. For this purpose the operator taps the face of the hoppers with a short handled 6-lb. sledge until the flow has started. Then, unless compressed air is available, he climbs to the top of the car and drives a slice bar down to the opening that has been made by tapping. As soon as he breaks through the flow becomes rapid. The slice bar may be a piece of ¾-in. pipe, flattened and spread at the point.

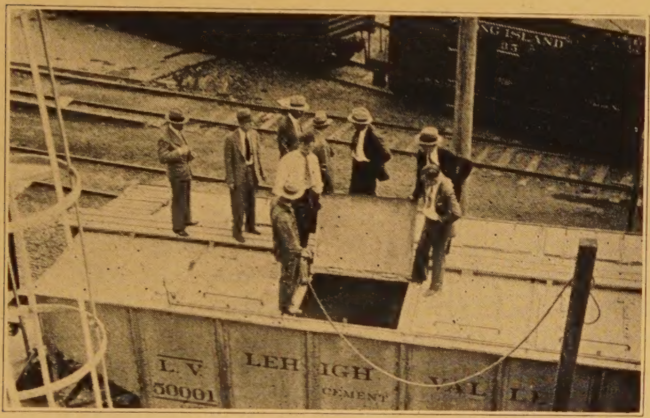


Figure 3. Watertight roof of car has eight openings

If compressed air is available an air lance can be used to loosen the packed cement. The use of an air lance is shown in Figure 3. In this instance a piece of ⅝-in. flexible tubing is used to connect the lance with the air line.

Sealing the Hatch Openings

Figure 3 also shows the manner in which the hatch covers are sealed. A long bar may be seen extending along the outside edge of the four covers, very near the edge of the roof. Four pieces of strap iron, all of which can be seen in Figure 3, are welded to the bar in such a position that when the bar is turned the pieces of strap iron close down over the hatch covers. Consequently the turning and sealing of this one bar has the effect of sealing four of the eight hatches. Thus the car requires but two seals on top and four seals on the four hopper outlets below.

Cost of Unloading

The cost of unloading a car of cement will, of necessity, vary in accordance with the unloading and conveying facilities available, and the distance from the car to the bins. Considering a typical case of a siding at a ready-mixed concrete plant, a concrete products plant, or a contractor's mixing plant, where a screw conveyor delivers the cement from the car to the boot of a bucket elevator, it is said that the cost of unloading should not exceed ½ cent per barrel.

In special cases where, because of elevated tracks or low level bins, the cement can be delivered to the bins entirely by gravity, the cost of unloading will be negligible.

Calcium Aluminates and Calcium Aluminate Cements

Reaction With Water Studied in Bureau of Standards Tests

In previous tests conducted by the U. S. Bureau of Standards it has been shown that the anhydrous calcium aluminates less basic than tricalcium aluminate, as well as calcium aluminate cements, reacted with water to form metastable monocalcium aluminate solutions in the early periods. The metastable solutions decomposed as the reaction proceeded, with the precipitation of hydrated alumina and either the hexagonal or isometric form of hydrated tricalcium aluminate. Below 21-25 deg. C. the hexagonal form appears to be the stable phase and above 25 deg. C. the isometric form is stable, although the hexagonal form may at first appear and slowly revert to the isometric form. The composition of the calcium aluminate solutions resulting from the reaction of water on the anhydrous calcium aluminates and calcium aluminate cements fall within a well defined region in the phase diagram $CaO\text{-}Al_2O_3\text{-}H_2O$.

With an increase in temperature from 20 to 40 deg. C. there is an increase in the speed of the reaction between water and calcium aluminate cements, the metastable solutions reaching a maximum sooner and decreasing from this maximum more slowly. The maximum is also at a higher concentration. This increase in the quantity of cement reacted upon with an increase in temperature could be expressed by logarithmic relation. At the higher temperatures the isometric tricalcium aluminate hydrate is the stable phase and below 20 deg. C. the hexagonal form is stable.

There is a region more alkaline than that wherein the reaction occurs during the reaction of water on the calcium aluminate in which hydrated tricalcium aluminate is precipitated free of hydrated alumina.

In a limited region in the system $CaO\text{-}Al_2O_3\text{-}H_2O$ hydrated tetracalcium aluminate is the stable phase. Since its solubility and that of hydrated tricalcium aluminate are very low in the more alkaline region, it is difficult to determine accurately the invariant point for these two solid phases. Likewise, since hydrated alumina undergoes a change with "aging" as evidenced by the petrographic microscope it is difficult to fix the invariant point where hydrated alumina and hydrated tricalcium aluminate are in equilibrium with one another. Although some of the boundaries in the phase diagram $CaO\text{-}Al_2O_3\text{-}H_2O$ have been determined, other fields need further investigation.

High-Early-Strength and Colored Cements New Yosemite Products

The Yosemite Portland Cement Co. is now manufacturing a one-day cement and is shortly to undertake the production of a colored cement.

Produce Various Colors of Clinker With Treated Raw Materials

Fluxing Agent and Metal Compound Added—Process for Green and Terra-Cotta Red Described

A PROCESS for the manufacture of colored portland cement, whereby the coloring matter is combined with the cement during the burning operation, is described in United States patent No. 1,829,082, granted on October 27, 1931.

Fluxing Agent and Metallic Oxides Added

In general the process consists of mixing with the raw materials substances such as phosphates, borates, or halogen compounds which act as a flux, and adding metal compounds such as oxide of chromium, nickel, cobalt, copper and the like, which have the effect of coloring the burned clinker.

Production of Green Clinker

In one method of procedure the mixture is in the proportions of 100 kg. of ground raw material, 4 kg. of fluor-spar, 1 kg. of borax, and 0.5 kg. of chromium oxide, and this mixture is burned at the sintering temperature in an oxidizing flame. The clinker thus produced, when ground into cement, has a pure green color. The use of 1 kg. of chromium oxide instead of 0.5 kg. produces a bright green cement.

Terra-Cotta Red Color

A second method of procedure involves the use of the same materials and proportions first given above, but with 1 kg. of coke added. The mixture is burned at the sintering temperature in a reducing flame. If a weak reducing flame is used in conjunction with an admixture of 0.75 kg. of chromium oxide instead of 0.5 kg., the cement produced has a terra-cotta red color.

The use of borax in conjunction with metal oxides for coloring the clinker gives rise to the formation of colored borosilicates having an analogy to colored glass.

With the use of sodium phosphate similar reactions occur, as follows:

$$3NaPO_3 + Cr_2O_3 = Cr_2(NaPO_4)_3$$

or, $NaPO_3 + CuO = CuNaPO_4$.

May Reduce Sintering Temperature

The amount of the fluxing substances added to the raw material may be made sufficient to cause an appreciable reduction of the sintering temperature.

In cases where the raw material contains iron oxide, it is best to reduce this oxide into metal by burning the material in a reducing flame, and thereafter to remove the reduced iron by known methods.

Coloring Matter in Natural State

Instead of adding the metal compounds that have the effect of coloring the burned clinker, it may be feasible to make use of raw materials containing a part or all of the necessary coloring matter in a natural state.

The holders of the patents covering these processes are Gustav Bergen, Dr. Felix Engelhardt and Richard Steckhan, of Brunswick (Braunschweig), Germany.

Low Fuel Consumption Attained in Recent Kiln Development

Low fuel consumption in burning cement clinker in two recently developed kilns is reported by the Kiln Commission of the Association of German Portland Cement Manufacturers (Verein Deutscher Portland-Cement Fabrikanten), whose head office is in Hanover, Germany.

One of the kilns tested by the kiln commission is known as the Andreas automatic shaft kiln, described in an illustrated staff article in the December (1931) *Cement Mill Edition* of CONCRETE, pages 53-55. The other kiln utilizes a combination of a sintering grate and a short rotary kiln, and is known as the Lepol system, described in an article in the September (1931) *Cement Mill Edition* of CONCRETE, and in the series of articles by T. H. Arnold in the more recent issues of April, May and June (1932).

FUEL CONSUMPTION OF RECENTLY DEVELOPED KILNS

		Heat and Fuel Consumption per Bbl. of Clinker (380 lb.)	
	Moisture content of raw meal	Heat consumed, in B.t.u.	Lb. of 12,500-B.t.u. coal required
Andreas shaft kiln	13.9%	801,240	64.1
Lepol kiln	12.8%	737,010	59.0

The accompanying table, showing the summary of results obtained in the test runs conducted by the German kiln commission, disclosed the characteristically low fuel consumption reported in the published articles just mentioned. In the commercial installations described in the articles, however, the fuel consumption is even less than that reported by the kiln commission.

Monolith Producing Velo in Southern California

The Monolith Portland Cement Company has undertaken the manufacture of Velo high-early-strength cement at its plant at Monolith, Calif.

Gas Pipeline Is Completed by Oklahoma Portland

The Oklahoma Portland Cement Co. recently completed a 21-mile pipeline to connect with gas fields in an adjoining county, guaranteeing a fuel supply at all times.

Inclined Rotary Shaft Kiln Under Development in Germany

Burns Wetter Material Than Present Types of Shaft Kilns—Handles Filtered Slurry—Experimental Results Promising

FOR about 25 years—at least in Europe—automatic shaft kilns and rotary kilns have operated side by side in the burning of cement. For large capacity operation the rotary kiln was considered to be the more suitable.

It is well known that the revolving-grate vertical shaft kiln, in consequence of its comparatively small surface of kiln lining, has the advantage in the matter of heat loss. Among its disadvantages is the adhesion of the clinker to the kiln lining in the sintering zone, thereby creating irregularity in the operation of the kiln; and above all, there is also the impossibility of using the shaft kiln with the slurry of wet-process operation.

Radiating Surface Compared

The table shows how much less the radiating surface of a modern shaft kiln is than that of a rotary kiln of equal capacity.

COMPARISON OF RADIATING SURFACE

Length of rotary kiln or height of shaft kiln	Diameter in ft.	Volume in cu. ft.	Radiating surface, sq. ft.	Capacity in bbl. per 24 hrs.
Rotary kiln, 197 ft.	8.2	10,380	5,005	900
Revolving-grate shaft kiln, 61.4 ft.	15.1	11,650	2,906	880

In addition to the advantage of less radiating surface, as shown in the table, there is always the possibility that the present efficiency of the shaft kiln can be improved upon. Even with so great an advantage possessed by the rotary kiln because of the freely burning pulverized coal flame, this flame and the hot gases can merely pass along the material to be burned, and can not heat it so effectively as the flame in the shaft kiln with its forced contact with the material.

Sees New Possibilities for Shaft Kilns

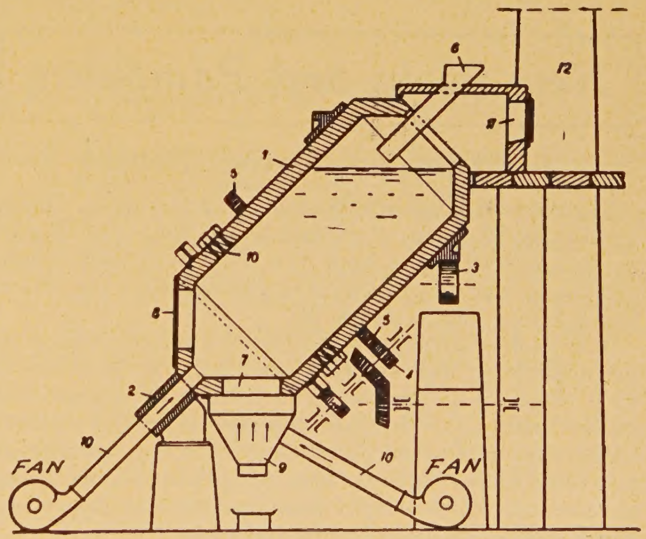
The treatment of raw slurry in the filtering process, which the writer observed during a visit to America 2½ years ago and reported in *Zement* (1930, Nos. 4 and 5), suggested new possibilities for shaft kilns, as a means of contributing toward improvement in the low state of the construction industry. Under the protection of German patent No. 548,663, and in the United States, the author developed an inclined rotary shaft kiln, having a large capacity and permitting the economical burning of cement and lime.

The drawing shows the kiln in cross-section. Set at an angle of about 45 degrees, of cylindrical form, the shaft revolves slowly about its inclined axis. The body of the kiln is held in place under a suitable cone-shaped support. This cone-shaped support is inclosed in an airtight metal casing or jacket. The clinker is drawn off from the metal casing through an airtight discharging device.

Sources of Air

The air draft comes from three sources—through the axial pinion, from below the clinker discharge, and through one or more bustle pipes around the lower part of the cylindrical body of the kiln. The last arrangement makes possible a degree of draft control heretofore unknown.

The inclined kiln has the peculiarity that by its rotation the incoming draft from below the clinker discharge is of little benefit, while the air coming through the circumference of the kiln moves upward, without penetrating the kiln grating. The forced draft, on the other hand, which enters through the lower cone-shaped support, must flow under compulsion through the contents of the kiln and it comes in intimate contact with the clinker because of the rotation of the kiln.



Cross-section of new inclined rotary shaft kiln

The slow rotation of the inclined shaft kiln produces not only the previously mentioned formation of the material in the kiln, but also a continually changing condition in the sintering zone of the kiln. The wall of the

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Translated from article by Hans Engel in *Zement,* May 19, 1932.

kiln cools off after having been in contact with the fire for half a revolution, thereby cooling the raw material.

The raw material will have fuel mixed with it before delivery to the kiln, and it can be wetter than the briquettes or nodules which at present are delivered to shaft kilns of analogous design. The volume and capacity of a kiln of this type ordinarily will be similar to that of an upright shaft kiln of equal size. The operation of the new kiln, however, can be forced to better advantage; therefore on an overload, assuming kilns of equal volume, it will produce more clinker than can be hoped for in types heretofore in use.

Discharging the Clinker

The inclined rotary shaft kiln differs from the revolving-grate shaft kiln in the clinker discharge. The kiln terminates with heavy grate-bars set at about 45 degrees slope. The basket-shaped grate inside the metal casing previously mentioned (which incloses the airtight discharging lock) discharges the clinker through the opening which lies directly under it. If the particles of clinker do not fall directly from the grate, but adhere to the grate, the rotation of the kiln crushes them and shears them off between the basket-shaped grate and the wall of the metal casing. The entire agitated, huge mass within the kiln aids in forcing out the clinker. Mechanical shaking of the grate is unnecessary.

This new type of kiln requires somewhat more space than an upright shaft kiln, but of course much less than a rotary kiln. Up to the present time very promising results have been obtained with a small experimental kiln.

New Books and Pamphlets

Textbook on Leather Belting

TREATISE ON LEATHER BELTING. By George B. Haven and George W. Swett. Published by the American Leather Belting Association, 41 Park Row, New York City. Cloth, 249 pages, 5 by 8 in.; illustrated with halftones, line drawings and diagrams. Price $1.50.

This book is a complete and highly practical treatise on the application and use of leather belting. It covers a wide scope, including the manufacture of leather and leather belting, the physical properties of leather suitable for belting, good practice in the use of belting, installation and care, leather belts on motor installations, belt drive engineering, belt research, specifications and inspection, and design tables, nomographs and plots.

World Directory of Cement Manufacturing Industry

INTERNATIONAL DIRECTORY OF THE CEMENT-LIME-GYPSUM INDUSTRIES (ADRESSBUCH DER ZEMENT-KALK-GIPS INDUSTRIE). Published by Bau-Kurier, Knesebeckstrasse, 30, Berlin-Charlottenburg, Germany. Cloth, 301 pages, 6 by 9 in. Illustrated. Price 15 gold marks.

This directory includes a complete list of cement manufacturing plants all over the world, grouped by individual countries, and also a similar list of lime and gypsum works in Germany. Addresses of the administrative offices of individual plants, and addresses of manufacturers' associations, are included.

Prices Advance in Southwest as More Plants Reopen

Advances in cement prices averaging 30 cents a barrel went into effect in at least eight west central and mountain states early in June. Manufacturers in Colorado, New Mexico, Missouri, Kansas, Texas, Arkansas, Oklahoma, and Nebraska, and including the Ideal company, announced increases of a maximum of 35 and 42 cents and striking an average of 20 cents a barrel. Topeka, Kansas, prices went up 42 cents.

Manufacturers in the vicinity of Chicago were encouraged over reports from salesmen indicating a slightly better feeling in the agricultural sections, according to the *Chicago Journal of Commerce* of June 20. Greater confidence will come with the clearing of political skies, the item states.

Concurrent with the increases, plant reopenings were general in several localities. One of the Three Forks plants in Montana, the Monolith Portland Midwest mill in Wyoming, and the Consolidated and Monarch plants in Kansas, are among those that have reopened in the past six weeks.

Operation of the Trident plant was scheduled for June 26, when more than a hundred men were to have returned to their jobs. A feeling of optimism exists and the outlook appears favorable for a continued run for some time, newspaper reports from the locality state.

The production department of the Laramie, Wyoming, plant reopened on May 13, after having been closed since September. The kiln was placed in operation several days later, and a total of eighty employes were given work.

After having been idle since the first of March, two kilns were placed in operation at the Humboldt plant of the Monarch company on June 1. Four days previous the Consolidated plant at Fredonia, Kansas, resumed, and assurance given that two months' run is assured, with a good possibility of operation continuing throughout the summer and into the winter. Sixty or more men are employed and all three kilns are in operation.

The Wabash Portland Cement Co. plant at Stroh, Ind., was another to resume operation late in May, after a suspension of about nine months. Full day and night crews were put on and a fairly steady run for the greater part of a year is anticipated.

Two other plants that reopened early in June are the Lehigh mill at Iola, Kansas, and the Alpha plant at La Salle, Ill.

Promotion Policies Brought Up at Association Meeting

The Spring meeting of the Portland Cement Association, held at the Biltmore Hotel, New York City, opened with standing committee sessions, on May 31. On the following day, technical problems were discussed at a general session. A paper, "Studies of Fuel Economies in Burning," by H. P. Reid of the Universal Atlas company, was an outstanding one.

Edward H. Mehren, president of the association, presided at the June 2 session, when a discussion of promotion policies to fit present conditions in road, residence and minor-use markets for cement were discussed.

EDITORIAL

Highways Engineers Must Be Convinced

A SURVEY of state highway construction practice with respect to the use of high-early-strength cement has been made by "Concrete." The results are soon to be published in the regular edition, but in the meantime it will be well worth while to disclose one important fact which the survey brings to light.

This fact concerns the attitude of highway engineers toward the use of high-early-strength cement.

A few of these engineers are convinced that high strength in 24 to 48 hours results in actual savings that offset the extra cost of the cement that produces this high early strength. On the other hand, a large majority still adheres to the belief that high-early-strength cement is economically useful only in special cases, as at intersections, for filling in short gaps in the pavement, in places where heavy traffic must be accommodated during construction, avoiding long detours in mountainous regions, for grade separation structures, and so on. For straightaway paving work they continue to specify ordinary portland cement.

Clearly, one problem facing manufacturers of high-early-strength cement is that of convincing highway engineers of the all-around utility of this product. If the cement proves up the qualities claimed for it, these engineers can be convinced; but the usual inertia against the acceptance of new ideas can be broken down only by sustained effort.

Cutting Production Costs in Two

A FINANCIAL article in the Chicago Daily News of June 13 severely criticized the steel industry (now operating at less than 20 per cent of capacity) because steel prices have been pegged at a level only 13.5 per cent below the 1929 peak, whereas the average price of all commodities has declined 32.1 per cent. Steel wages, in the meantime, are 23.5 lower than in 1929.

In commenting on this situation, in a letter printed in the Daily News of June 16, T. G. Dickinson, president of the Marquette Cement Manufacturing Company, pointed out the folly of attempting to stimulate buying without a substantial price deflation, or of attempting to operate economically when utilizing only 20 per cent of the capacity of an industry.

Then Mr. Dickinson had something to say about cement manufacturing—something well worth driving home to the entire industry. "During all these troublesome times," he said, "we have made capital expenditures for the purpose of reducing costs and increasing output. We have cut our costs in two, not wholly through the reduction of salaries and wages, but through efficient operation. In the meantime we have cut prices to the consumer. . . . . We are not making any money to speak of, but we are not losing any, and we are finding buyers for our entire production.

"No industrial organization can keep its obsolete plants in its capital structure successfully. No industrial organization can operate economically at 20 per cent of its capacity."

This again supplies evidence that the production costs of the period from 1926 to 1929 can not be taken as a basis for production costs in 1932, even after making allowance for lower labor and material costs. A large slice of the present reduced production costs in some cement plants must be credited to the installation of modern equipment and the improvement of methods. Only in that way has it been possible to cut costs in two.

The Competition of the Thirties

"THE new Blank Cement Company has the most ambitious manufacturing and merchandising program ever dreamed of in the cement industry," writes a correspondent of "Concrete." "It would take a page," he continues, "to tell you of all the products and by-products that plant will turn out. In this section the feeling is that the staid old cement industry must develop some 'crazy' merchandising ideas, or it will be sunk. It is felt also that so-called standard portland cement will be only a memory, and that cement manufacturing companies will be trying to outstrip each other with new products and better merchandising methods."

Here is additional proof that things are happening in the cement industry. The manufacturing and merchandising methods of the nineteen twenties won't fit into the revived nineteen thirties at all. The coming competition will be a competition of products as well as of service.

Colored cement has already entered the field, and more of it will make its appearance. The products and by-products to be developed and the merchandising methods to be employed may leave some of the old-line cement manufacturers breathless. Obsolete plants and antiquated sales methods will prevent many companies from being factors in the new competition of the revived nineteen thirties.

Latin-American Market for Cement for Roads and Streets

Mexico and Central America Comprise Leading Latin-American Cement Outlet—Expect Resumption of Road Construction

By F. J. McCARTHY, JR., and CARL A. GNAM
Minerals Division*

The Latin-American market for petroleum asphalt and cement for road and street building is comparatively small but expanding. During the present period, however, ambitious plans promulgated in more prosperous years have been forced to a temporary standstill.

Only during the past few years have Latin-American countries recognized the necessity for improved roads. Roads of all types throughout Latin America have been estimated to total 380,000 miles, of which only about 14,000 miles are macadam and 600 of macadam surface-treated—a small amount when the area, population, and economic development of this region are taken into consideration. These figures do not include the mileage of city streets. Urban use of asphalt and concrete thus far is confined to the larger cities, so that a considerable potential market for these two commodities exists not only in intercity and intercountry highway development, but also in the medium and small towns.

Road construction, of course, takes only a part of the cement exported from the United States. It has been estimated that about 40 per cent of the cement produced in the United States in 1931 was used for road building and the Latin-American percentage of total consumption probably is considerably smaller.

Total cement exports from the United States recorded an almost steady decline from 974,000 barrels in 1926 to 755,000 in 1930. The trade with Latin America, which comprises the largest part of the total, has been declining more rapidly than total cement exports. In 1926 Latin America purchased 93 per cent of United States exports of cement; and in 1930, 87 per cent. This change occurred although consumption in Latin America increased from 8,910,000 barrels in 1925 to an estimated 18,276,000 in 1929. Total imports into these countries also increased but not so rapidly—from 6,725,000 barrels in 1925 to 9,181,000 in 1929. During this same period imports from the United States decreased from 960,000 barrels in 1925 to 761,000 in 1929, causing the United States share of total Latin-American cement imports to drop from 14 per cent in the former year to 8 per cent in the latter.

A major reason for the decline of United States sales in a market relatively close, and which is increasing consumption and imports, is the lower price quoted by Belgium, the Netherlands, Norway, Sweden, Germany, the United Kingdom, and other European countries. Production of cement in Latin America, furthermore, increased 236 per cent between 1925 and 1929. Six years ago it met only one-fourth of the requirements of the countries, which imported the remaining three-fourths of their supplies; by 1929 it furnished one-half of the cement consumed.

Mexico and Central America now offer the most important Latin-American market for United States cement. This is the only Latin-American region, moreover, where purchases actually have shown increases, both in amount and in percentage of total United States-Latin-America cement trade. In 1926 Mexico and Central America purchased 203,000 barrels of cement from the United States, or 23 per cent of its sales to all Latin America; by 1930 the amount had grown to 303,000 barrels, or 46 per cent of the total.

Mexico, a large producer of cement, was also the largest Latin-American purchaser of United States cement in 1930. The high freight rates on the Mexican railways from production to consumption centers have given an advantage to the United States product in certain places along the coast and border. Panama was the second largest purchaser in this area and Honduras was third.

United States statistics for cement exports to Latin America, for all purposes, are shown in the following table:

EXPORTS OF HYDRAULIC CEMENT TO LATIN AMERICA

Area and country	1926	1927	1928	1929	1930
Mexico and Central America:	*Barrels*	*Barrels*	*Barrels*	*Barrels*	*Barrels*
British Honduras	14	31	54	3	51
Costa Rica	1,776	1,945	2,308	3,190	491
Guatemala	3,152	5,666	4,168	3,082	1,890
Honduras	19,171	15,487	14,404	37,663	47,673
Nicaragua	2,331	1,795	3,309	2,530	2,941
Panama	49,211	92,245	100,955	95,266	122,796
Salvador	5,685	2,010	520	1,325	555
Mexico	121,546	78,516	77,676	174,208	126,803
Total	202,886	198,695	203,394	317,267	303,200
West Indies:					
Bermudas	7,241	5,326	1,887	2,435	17,174
Barbados	6	12	20	10	78
Jamaica	41	159	22	6	2,711
Trinidad	108	210	—	2,075	32
Other British West Indies	23,183	11,363	10,772	19,418	16,826
Cuba	134,495	107,020	99,907	102,257	66,258
Dominican Republic	8,920	3,513	4,277	2,926	1,663
Netherland West Indies	7,527	3,321	18,657	26,467	18,087
French West Indies	—	10	—	40	476
Haiti	35,696	44,639	21,446	13,247	8,477
Virgin Islands	5	84	301	647	99
Total	217,222	175,657	157,289	169,528	131,881
South America:					
Argentina	43,110	49,279	67,899	70,264	55,620
Bolivia	441	—	4,619	7,598	4,083
Brazil	12,557	15,222	24,011	25,637	16,302
Chile	32,159	15,723	4,847	7,907	7,806
Colombia	75,212	56,920	69,194	29,325	33,692
Ecuador	6,112	3,793	2,466	2,045	1,080
British Guiana	41	—	5	5	—
Surinam	4,100	500	—	—	54
French Guiana	165	330	165	495	495
Peru	17,596	14,030	8,376	6,508	2,807
Uruguay	27,503	77,852	75,051	16,519	16,588
Venezuela	262,192	119,243	81,913	108,090	95,066
Total	481,188	352,892	338,546	274,393	223,593
Grand total	901,296	727,244	699,229	761,188	658,674

Purchases of United States cement in the West Indies have declined considerably during the past five years. Practically every market of any size in this area, except the Bermudas and the Netherland West Indies, reduced imports in this class. In some countries cement consumption was reduced, and in others there was an increase in domestic production, particularly in Cuba, formerly the United States' largest cement customer in this area. Cuba had no production in 1925, but produced 2,100,000 barrels of cement in 1929. Total imports declined over the same interval from 590,000 to 150,000 barrels.

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*Condensed from *Commerce Reports*, January 4, 1932.

Air Separator Device Determines Fineness Distribution

Air Current Controlled to Provide Definite Pressure—Analyzes Size Distribution Down to Ten Microns—The Test Procedure

By **ORLA A. LARSEN**
Chemical Engineer, F. L. Smidth & Co., New York

THE steadily increasing fineness of cement called for in present-day manufacture of portland cement, as well as high-early-strength cement, has caused cement manufacturers to pay greater attention to a reliable means of determining such high finenesses.

The fineness of the cement should, to the cement manufacturer, not only reveal an indication of the physical strength which can be expected of the cement, but also give him some indication of the actual work produced by his grinding machines used by him to obtain this fineness.

In the earlier days of cement manufacture, when the fineness of the cement reached only a maximum of about 80 per cent passing a 200-mesh sieve, the screening of the cement on this sieve fulfilled these requirements to some extent.

However, as the fineness requirement increased, the 200-mesh sieve could no longer be considered sufficiently reliable, and the 300 and 325-mesh sieves found greater and greater use in up-to-date cement laboratories.

Finest Sieves No Longer Adequate

In the present-day manufacture of cement even the 300 and 325-mesh sieves can not be considered sufficiently reliable, as these sieves do not give the true indications of the expected strength or of the actual work produced by the grinding machines.

As a whole the majority of cements, both portland and high-early-strength cement, are composed of particles varying in sizes from 1 to 150 microns.

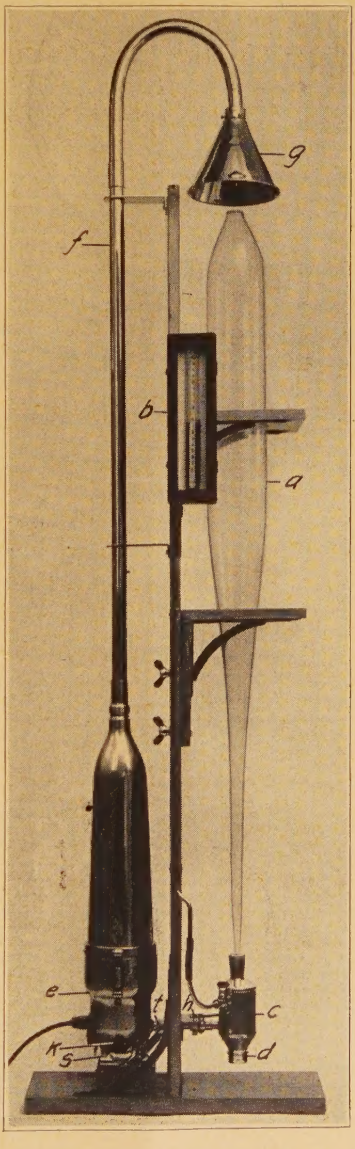
If we examine the particle distribution in a sample of portland cement, we have the following approximate figures:

Particles finer than:	
150 microns	100 per cent
75 microns	90 per cent
45 microns	78 per cent
30 microns	65 per cent
20 microns	50 per cent
10 microns	30 per cent
5 microns	15 per cent
1 micron, less than	2 per cent

For a properly ground high-early-strength cement we will find higher percentages of flour. For example, the percentage of particles finer than 75 microns (the 200-mesh size) will be 97 per cent, while correspondingly higher percentages will be found also for particles smaller than 45, 30, 20, 10, 5, and 2 microns.

If these two cements are compared as to fineness and only the 200-mesh sieve is used, we find that the screening test for the portland cement only discloses the knowledge to us that 10 per cent of the cement has particles of sizes between 150 and 75 microns. For the high-early-strength cement the screening on the 200-mesh sieve is of lesser value, as it gives us knowledge of only about 3 per cent of the cement.

If the two cements are compared as to fineness and the 325-mesh sieve is used, our knowledge obtained about the portland cement takes in about 22 per cent of the cement, and only about 12 per cent of the high-early-strength cement. No information at all is obtained as regards the bulk of the cement, namely, 78 and 88 per cent, respectively.



Apparatus employs air currents to determine fineness distribution of cement

Other Methods Necessary

This analysis illustrates clearly the necessity of having other available means than wire cloth screens for determining the actual particle distribution in cement, for without this knowledge we can not estimate the influence the fineness will have on the physical strength, or make any true comparison as to the real grinding efficiency of various grinding machines or methods.

As the strength of cement is influenced by the actual percentages of 10, 20 or 30-micron particles in the cement, a comparison of grinding efficiency of two machines should not be based on a 200-mesh screen which practically gives no knowledge as to the cement manufactured. The comparison should be based on the actual tonnage of fine particles produced.

In order to convey this knowledge to the cement manufacturer, the apparatus shown in the figure has been developed. It consists of a large glass tube "a" connected to a small blower "e" which is arranged to blow an air current through a receiver "c" up through the glass tube.

The Test Procedure

The manipulations in operating a fineness test on a small sample are the following:

The blower is started and the air pressure is adjusted by means of a cock "h" to give a certain pre-determined pressure measured on the manometer "b". The pressure selected depends in each case on the particle sizes at which the sifting is supposed to take place.

As soon as the correct pressure has been read on the manometer, a small weighed sample of cement is charged into the glass tube, where the coarse particles are held in suspension by the air current, while the particles finer than the particle size at which the separation takes place are carried out of the glass tube.

To avoid dust nuisance the fine particles are sucked into the funnel "g" and through pipe "f", which passes into a filter bag. The filtered air is then blown back into the separator.

After about 25 minutes of operation the blower is stopped and the residue, consisting of the coarse particles only, drops down into a small detachable cup "d" on the bottom of the receiver. The cup is then removed and weighed.

With this separator, it is, for most samples, possible to determine the percentage of 10, 20 and 30-micron sizes in the cement; or, in other words, by means of this separator it is possible to get a clear knowledge of the particle distribution which embodies at least 60 to 70 per cent of the cement.

If a knowledge of the particle distribution of sizes below 10 microns in the cement is desired, available means other than separation by air must be used.

The apparatus here described is known as the "F. L. S. separator," and was developed by F. L. Smidth & Company, of New York.

Measurement of Particle Size With Accurate Air Analyzer

In a paper presented to the 35th annual meeting of the American Society for Testing Materials, held at Atlantic City, N. J., June 20-24, P. S. Roller described an air analyzer which has been improved to increase the rate of separation and the convenience of manipulation.

The paper includes the results of a particle-size analysis of three representative portland cements in terms of percentage, by weight, falling in the size ranges 0-5, 5-10, 10-20, 20-40, 40-80 and 80 (plus) microns. For the microscopic investigation of the size range from 0 to 5 microns, or of similar finely divided powder, the author describes a method of rapidly dispersing the powder on the microscopic slide by the use of a No. 24-gauge platinum wire and a drop of saponin solution.

* * *

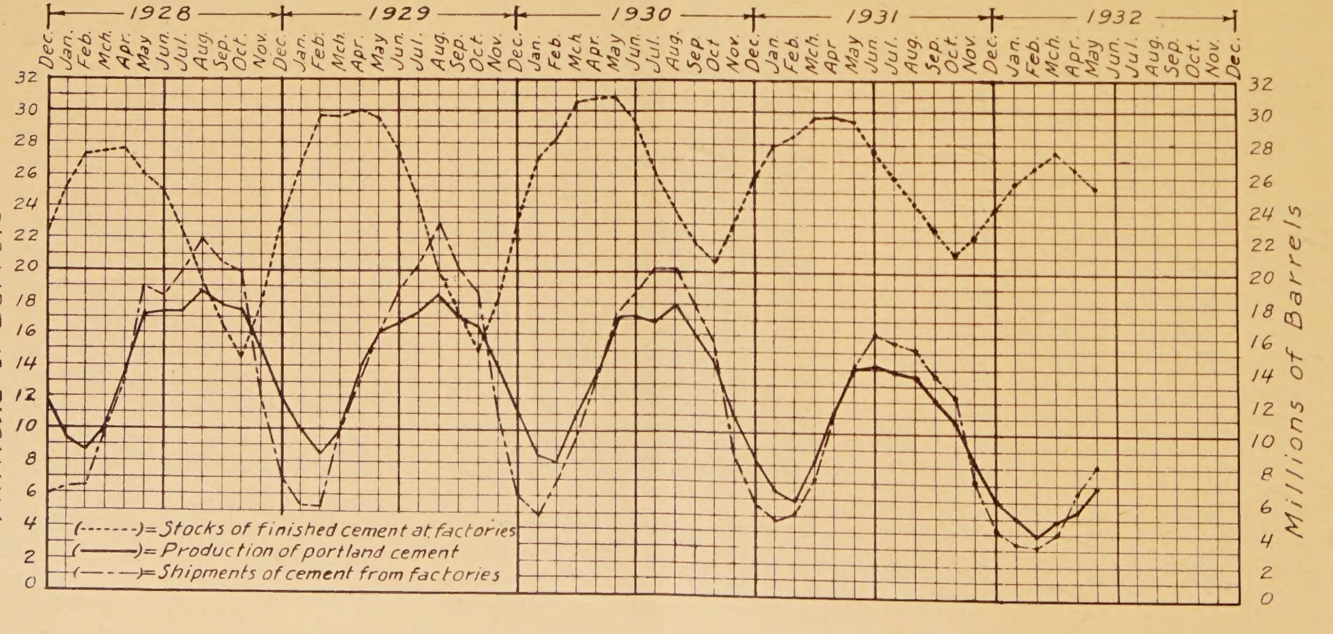
Cement Statistics for May

Relation of Production to Capacity

	The Month	Twelve Months
May, 1932	30.2	38.9
May, 1931	62.8	56.5
April, 1932	24.8	41.7
March, 1932	21.3	43.8
February, 1932	18.7	45.2

Production, Shipments and Stocks of Finished Portland Cement

	1931	1932
Production, May	14,010,000	6,917,000
Shipments, May	14,200,000	8,048,000
Stocks at end of month	29,554,000	25,365,000
Production for year to date	46,015,000	26,239,000
Shipments for year to date	42,342,000	25,068,000



Summary of Physical Properties of Components of Cement

Results of Study of Chemically Pure Compounds of Tricalcium Silicate, Dicalcium Silicate, Tricalcium Aluminate and Dicalcium Ferrite

By D. L. SNADER
Research Fellow, Columbia University, and Professor of Civil Engineering,
Stevens Institute of Technology

The February and March issues of the Cement Mill Edition of "Concrete" contain a report on R. J. Colony's studies of four chemically pure compounds believed to be the principal components of portland cement, and the application of these studies to commercial portland cements.

The April and May issues contain a report on D. L. Snader's investigation of the physical properties of chemically pure samples of the four compounds.

In this issue D. L. Snader's conclusions are given, as published in Bulletin No. 4 of the Department of Civil Engineering, Columbia University. A summary of the conclusions reached by R. J. Colony, following his study of the four components under investigation, appears on page 62 of the March issue.—The Editors.

(Concluded from the May issue.)

A SUMMARY of facts determined from the author's investigation of the physical properties and characteristics of chemically pure tricalcium silicate, dicalcium silicate, tricalcium aluminate and dicalcium ferrite is given here, for the purpose of assembling these facts in convenient form. Stated as briefly as possible, these facts follow:

1. Tricalcium Silicate

(a) Tricalcium silicate requires a minimum of 58 per cent of its own weight of mixing water to reduce it to normal consistency.

(b) There is no rise in temperature after addition of the mixing water, no flash set occurs, but it possesses a striking characteristic of "settling down" during mixing and placing in the molds.

(c) The small test cylinders could be safely removed from the molds at the end of two days, so that the rate of setting and hardening is not as rapid as for tricalcium aluminate or dicalcium ferrite, but much more rapid than for dicalcium silicate.

(d) For ages up to six months no volumetric changes occurred during curing in the damp closet, and no checking or cracking could be detected under a magnification of 14X.

(e) Tricalcium silicate increases steadily in strength with age and at the age of 6 months it has the highest compressive strength of any of the compounds.

(f) After 9 months' immersion in water the soundness and structural stability of cylinders of hydrated tricalcium silicate do not appear to be affected. No checking or cracking could be detected under a magnification of 14X and the compressive strength was 7,600 lb. per sq. in.

(g) As early as 2 days after immersion in water crystals of calcium carbonate appear on the surface of the cylinders, indicating the presence and liberation of lime in the hydrated mass; and after 9 months' immersion in water these crystal formations of calcium carbonate became profuse and could easily be removed from the cylinders in large convex pieces and sheets.

(h) A small increase in volume was found from absorption when small cylinders of tricalcium silicate were immersed in water, a maximum of 1.36 per cent for cylinders immersed 37 days in water.

(i) The percentage of water absorbed varied with age of the cylinders before immersion and was found to average 26.6 per cent absorption for immersion 37 days, and aged 120 days in the damp closet before immersion. Absorption was most rapid during the first 15 to 30 minutes.

(j) Tricalcium silicate appears to be the most valuable component of portland cement. It sets and hardens rapidly, does not undergo volumetric change during storage in the damp closet, remains sound, and has high enduring qualities under severe conditions of exposure. Its compressive strength is relatively high and increases with age.

2. Dicalcium Silicate

(a) A minimum of 27 per cent of its own weight of mixing water is required to produce normal consistency.

(b) There is no rise in temperature after addition of the gauging water, no flash set occurs and no remixing is required during placing in the molds.

(c) It sets and hardens very slowly; the small cylinders could not be safely removed from the molds until seven days after molding, and even then great care was required to guard against breakage.

(d) The setting, hardening and increase in strength is very slow, gradual and continuous for a long period of time.

(e) Hydrated dicalcium silicate is more granular in texture than any of the four compounds studied, and the cylindrical surfaces are somewhat powdery and chalky and do not become exceedingly smooth and glassy.

(f) For ages up to six months no volumetric changes occurred during curing in the damp closet, and no checking or cracking could be detected under a magnification of 14X.

(g) At the age of 7 days dicalcium silicate has the lowest compressive strength of the four compounds. It increases in strength slowly with age, and at the age of 6 months its compressive strength is only 60 per cent of that of tricalcium silicate.

(h) After 9 months' immersion in water the soundness and structural stability of cylinders of hydrated dicalcium silicate do not appear to be affected at all. No checks or cracks could be detected under a magnification of 14X and the compressive strength was 4,250 lb. per sq. in.

(i) Crystalline deposits of calcium carbonate form on the surface of the cylinders when immersed in water, which dissolves and liberates lime from the hydrated mass. After 9 months in water these crystalline surface deposits are pronounced and could be removed only with considerable difficulty and then only in powdery form; but they are not as profuse and not as definite in appearance as the crystals of calcium carbonate that form on the surfaces of cylinders of hydrated tricalcium silicate when immersed in water.

(j) Only a very small increase in volume was found from absorption when cylinders of dicalcium silicate were immersed in water. An increase in volume of 0.79 per cent was found for cylinders immersed 9 months in water.

From Bulletin No. 4, Department of Civil Engineering, Columbia University, New York.

(k) The percentage of water absorbed was less than that for tricalcium silicate, and varied but little with age of the cylinders before immersion. The absorption for cylinders immersed 16 days in water and aged 180 days in the damp closet before immersion averaged 17.7 per cent.

(l) Dicalcium silicate appears to be a valuable compound in portland cement, even though it is slow setting, has low early compressive strength and slow increase in strength with age. It does not undergo volumetric change during aging in the damp closet, remains sound, and has high enduring qualities under severe conditions of exposure.

3. Tricalcium Aluminate

(a) A minimum of 60.5 per cent of its own weight of mixing water is required to produce normal consistency.

(b) A striking rise in temperature occurs immediately after addition of the mixing water, which continues during the first 12 minutes, after which there is a gradual decrease in temperature.

(c) Another striking characteristic is the rapid initial set, a flash set, which requires extremely rapid placing in the molds. Three or four minutes after completion of mixing, remixing without the use of additional water is required so that placing in the molds may be completed.

(d) Hydrated tricalcium aluminate sets and hardens rapidly; the small cylinders can be safely removed from the molds after 24 hours.

(e) A small increase in volume occurs during the first two weeks of curing in the damp closet, during which time the volume appears to become practically constant.

(f) A small number of longitudinal and transverse cracks developed in all cylinders soon after molding and during storage in the damp closet. These were observed under a magnification of 14X as early as 23 hours after molding.

(g) At the age of 7 days tricalcium aluminate has the second highest compressive strength. It continued to increase in strength with age, during the time covered by these tests, and at the age of 6 months its compressive strength was found to be 82 per cent of that of tricalcium silicate.

(h) Cylinders of hydrated tricalcium aluminate when immersed in water begin to disintegrate almost immediately. Disintegration proceeds rapidly until in some cases the cylinder in about 10 days is often reduced to muck which with small pieces and fragments of the original cylinder embedded in it collects in the bottom of the vessel. At the same time thick coatings of calcium carbonate collect on the surface of the water and on the sides of the glass vessel.

(i) A large increase in volume was found when small cylinders of hydrated tricalcium aluminate were immersed in water. This amounted to 14.85 per cent for cylinders immersed 26 days in water. The increase in volume is rapid during the first 4 hours and amounted to 10.26 per cent during the first 4 hours.

(j) The percentage of water absorbed was found to be large and extremely rapid and amounted to 15.7 per cent during the first 15 minutes' immersion in water.

(k) Tricalcium aluminate has the valuable property of setting and hardening rapidly and has a relatively high compressive strength; but under the action of contact water it undergoes a large increase in volume and disintegrates rapidly and completely. Tricalcium aluminate may not exist as a component of portland cement, or if it does occur as one of the components, it must be present only in small percentages. From the characteristics, properties and action found for hydrated tricalcium aluminate it is difficult to see how it could exist in any appreciable quantity as a component of cement without being very detrimental to the concrete made out of such cement.

4. Dicalcium Ferrite

(a) A minimum of 24.5 per cent of its own weight of mixing water is required to produce normal consistency.

(b) There is no rise in temperature after addition of the mixing water, no flash set and no remixing required during the time of placing in the molds.

(c) The mixed material is somewhat "pasty" and "gluey."

(d) Hydrated dicalcium ferrite sets and hardens rapidly. The small cylinders could be safely removed from the molds 22 hours after placing. Two hours after placing the hydrated material in the molds, the cylinders are harder than those of dicalcium silicate at the age of 2 to 3 days; and three hours after placing, they are as hard as those of dicalcium silicate at the age of 5 to 7 days.

(e) Cylinders of hydrated dicalcium ferrite increase very greatly in volume during curing in the damp closet. This increase in volume was continuous over the entire period of observation of 6 months, and about three-fourths of it occurred during the first month.

(f) Numerous checks and cracks developed in all cylinders almost immediately following molding, and during storage in the damp closet. These are coincident with and related to the great increase in volume. They were definitely visible at the age of 22 hours and continued to grow and expand during the entire period of observation of 6 months. At the age of 14 days they penetrate very deeply into the cylinder, apparently to its center.

(g) The cracking extends throughout the entire mass and cylinders subjected to compression break into many small pieces somewhat uniform in size.

(h) At the age of 7 days dicalcium ferrite has the greatest compressive strength of the four compounds. It decreases in strength with age up to about 2 months, after which there is a small increase in strength. At the age of 6 months its compressive strength is the lowest of all of the four compounds, and is only 15 per cent of that of tricalcium silicate.

(i) The disintegration of cylinders of hydrated dicalcium ferrite is accelerated by immersion in water. After 2 to 3 hours' immersion in water the condition is about the same as the condition after 4 to 6 months' storage in the damp closet. Actual falling apart of the cylinder begins within about one hour after placing in water, and the breaking up is fairly complete in from 2 to 6 days of immersion in water.

(j) A large increase in volume was found when small cylinders of hydrated dicalcium ferrite were immersed in water. The percentage increase during the first four hours is only about one-fourth as much as for tricalcium aluminate, but it is continuous over long periods of time. An increase in volume of 36.14 per cent was found for cylinders immersed 50 days in water and previously aged 14 days in a damp closet.

(k) The percentage of water absorbed by cylinders of hydrated dicalcium ferrite was found to be high, and very rapid. It was found to average about 11.0 per cent after the first 15 minutes' immersion in water.

(l) Dicalcium ferrite is volumetrically the most unstable of the four compounds studied. Along with the large increase in volume of cylinders of hydrated dicalcium ferrite, disintegration results from the formation of numerous checks and cracks during curing in the damp closet. The increase in volume and disintegration are greatly accelerated by contact water. The characteristics, properties and action of hydrated dicalcium ferrite appear to be such as to make it a detriment as a component of cement. From the results of the study by R. J. Colony, dicalcium ferrite is not a normal component of portland cement.

Kink for Removing Soot from the Boiler

Vacuum Cleaner Principle Applied—Operates on Pressures Above 25 Lb.—The Cleaning Procedure

By W. F. SCHAPHORST, M. E.
Newark, N. J.

AN excellent kink for cleaning soot out of the tubes of horizontal return tubular boilers is illustrated in Figure 1. Instead of blowing against the natural draft, this device blows with the natural draft, and consequently it is surprisingly effective in keeping the tubes free from soot.

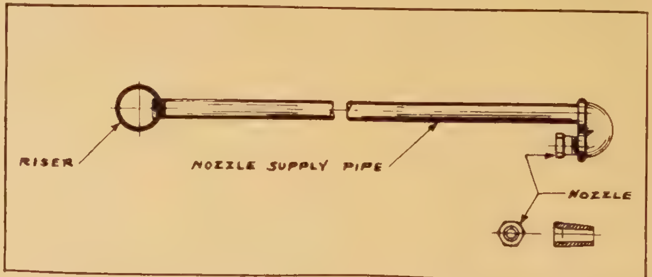


Figure 1. Nozzle supply pipe and return nozzle

Arrangement for Cleaning

Figure 2 shows, at the right, how these cleaner pipes are inserted in the tubes and how all of them are connected to a common header or riser. The left part of Figure 2 shows how the boiler is divided into two sections so that one-half of the boiler is cleaned by opening one of the supply valves shown at the extreme left. After

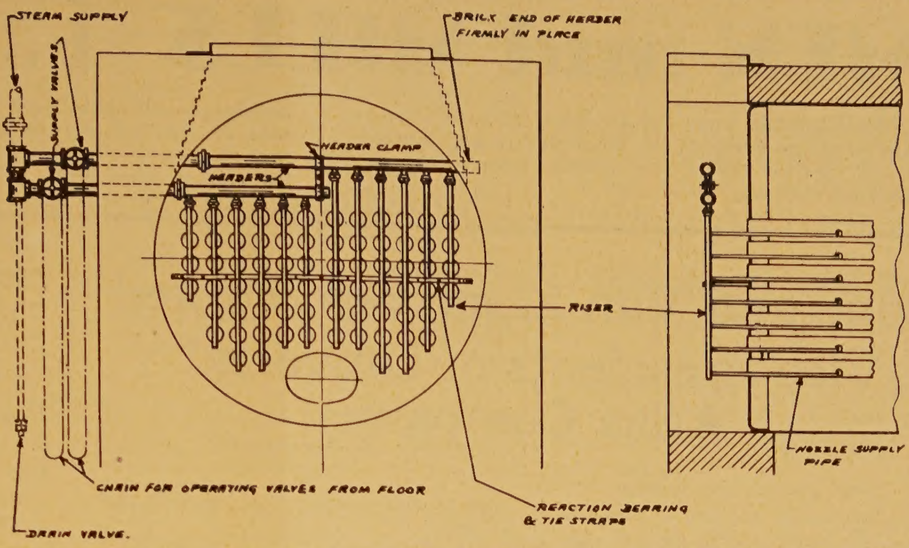

STEAM SUPPLY
SUPPLY VALVES
BRICK END OF HEADER FIRMLY IN PLACE
HEADER CLAMP
HEADERS
RISER
NOZZLE SUPPLY PIPE
CHAIN FOR OPERATING VALVES FROM FLOOR
REACTION BEARING & TIE STRAPS
DRAIN VALVE.

Figure 2. Arrangement of cleaner pipes

that valve is closed the other valve is opened and the remaining half of the boiler is cleaned.

In other words, to make sure that this method of cleaning is made perfectly clear, this cleaner consists of two or more header manifolds from which the cleaner elements drop. There is one element or riser at the end of each vertical row of boiler tubes. From these elements nozzle extension members enter the boiler tubes and each of these nozzle extension members terminates in a return nozzle. The design of the return nozzle is clearly shown in Figure 1.

The Cleaning Procedure

To use the cleaner the operator merely opens the supply valve to the section he wants to clean. A strong induced draft is immediately created which pulls the products of combustion toward the front of the boiler. Of course this draft tends to reduce the pressure in the combustion chamber. In fact there is a counter flow of the gases through the tubes which are not being blown at that time. The high velocity steam jet intensifies the draft to such an extent that even if pieces of brick are laid in the tubes they will be pulled through. With this method of cleaning, all soot and ash accumulations are dislodged and thoroughly removed, so that there is a complete cleaning of the tubes.

Does Not Affect Natural Draft

It might be thought that the nozzle members in the tubes tend to "plug up" the tubes. That is not true. The nozzle members do not affect the natural draft at all when the cleaner is not in use. The reason for this becomes evident when it is realized that the temperature in the combustion chamber is two or three times as great as the temperature in the smoke box. It is the temperature of the gases which governs the volume of the gases, and the volume of gas is proportional to the temperature. Therefore the volume of gases leaving the boiler tubes in the smoke box is only one-half to one-third of the volume of gases entering the tubes in the combustion chamber. This means that less than one-half of the tube area is required in the smoke box than is required in the combustion chamber. Since the nozzle extension members take up considerably less than half the volume, the draft is never affected.

There is another use for this design. For instance, when there is a sudden demand for steam, one of the valves can be cracked, thereby intensifying the draft and boosting the fire quickly. My friend who developed this kink informs me that the cleaner operates efficiently on all pressures above 25 pounds.

Price Chaos Laid to Trucking in Paulson Letter

Recent editorial comment by the Chicago *Journal of Commerce* on the question of truck traffic regulation brought forth a letter presenting the shipper's angle, from Frederick E. Paulson, vice-president of the Lehigh Portland Cement Company, at Allentown, Pa., and a recent witness before a Senate investigating committee.

The essence of Mr. Paulson's letter, taken from his statement before the committee, is as follows:

"The cement industry has built up its distribution on the basis of regulated transportation rates. Until shortly after the war, aside from the limited tonnage moved by water, the railroad was the only means of transportation. The railroads were, and are, regulated by law.

"Cement rates for the past decade have been stable. Therefore, up to the time that the truck made its appearance, one of the most stable elements incident to the marketing of cement was the cost of transportation.

"It is not our purpose to unduly burden the trucking industry nor to take sides as between railroad transportation and highway transportation. Both have their proper place and if property can be transported more economically by truck than by rail, it is to the interest of the public that the cheaper means should be employed. Open and stable rates and practices, however, instead of hindering highway transportation, should and would help it because it is common knowledge that a great deal of trucking is done without profit and in many instances at less than cost."

MEN and MILLS

[News of and for Cement Mill Men]

A clearing-house page for all kinds of local cement mill news—to promote the comradeship and mutuality of interest that exists among those who make portland cement.

Readers in all mills, even though not regular contributors, are invited to send in news notes about personal and plant activities that may be of interest or value to the men in other mills.

Stone and Van Zandt are Elected Vice-Presidents of Universal Atlas Company

F. L. Stone, general sales manager, and Paul C. Van Zandt, assistant to president in connection with operations and engineering, were elected vice-presidents at a meeting of the board of directors of the Universal Atlas Cement Company on June 8.

Mr. Stone joined the Universal Atlas company over twenty years ago as a salesman. He became successively division sales manager, assistant general sales manager and general sales manager which latter position he has occupied since 1928. He is a member of the American Iron and Steel Institute, Railway Business Association, New York Club, Chicago Club, Indiana Society, Izaak Walton League, Campfire Club and Exmoor Country Club.

Mr. Van Zandt, vice-president in charge of operations, came to the Universal Atlas company after thirty years' engineering and operating experience in the cement manufacturing field in the United States, Canada, Mexico, Cuba and the Orient. He is the inventor of the compeb double grinding cement mill known for its simplicity and economy. For five years he was chief engineer of the Asano Portland Cement Co. in Tokyo and prior to that was connected for eighteen years with the Allis-Chalmers Co. in connection with cement plant work. He is a mechanical engineering graduate from Purdue University and a member of the American Society of Mechanical Engineers, the Chicago Engineers Club and the Rolling Green Country Club.

Wm. G. Hudson Is Made Colonel; on Governor's Staff

William G. Hudson, district engineer at New Orleans for the Portland Cement Association, has been appointed on the staff of Governor Allen, of Louisiana, with the rank of colonel.

Colonel Hudson has been with the Portland Cement Association for ten years or more, having been in charge of the sub-office at Shreveport prior to his appointment as district engineer in the early part of 1930.

To him belongs a large measure of credit for the development of the successful concrete highways program for the state of Louisiana, which resulted in the construction of about 1,500 miles of concrete roads in 1930 and 1931.

Joseph S. Young Is Elected President of Lehigh

Probably the most youthful head of a leading cement company, Joseph S. Young, was elected to the presidency of the Lehigh Portland Cement Company on May 16. He is 33 and succeeds his father, the late Col. E. M. Young. He was formerly vice-president and assistant to the president.

Mr. Young was born at Allentown, Pa. In 1917 he enlisted in the Pennsylvania national guard and later served as an instructor in the Machine Gun Officers' training school at Camp Hancock, Ga. Following discharge, he resumed his studies at Princeton and graduated in 1920.

Its new president entered the employ of the Lehigh company in the fall of 1923. In 1926 he was elected to his prior position and in 1931 his election as a member of the board of directors of the company took place.

International Portland Changes Corporate Name

Spokane Portland Cement Company is the new corporate name of the International Portland Cement Co., Ltd., Spokane, Washington, effective July 1. The home offices are located at the same address—Old National Bank Bldg.

The officers of the Spokane company are as follows: R. K. Neill, president; H. M. Heleniak, treasurer and sales manager, and G. M. Bell, secretary.

Withrow Leaves Medusa; to Enter Waterproofing Business

R. E. Withrow, manager of the technical department of the Lehigh Portland Cement Co., has left that organization, effective June 30.

Mr. Withrow plans to engage in the manufacturing and contracting of waterproofing, as well as a general waterproofing business. His experience in the field covers more than 25 years, almost 11 years having been spent with the Medusa company.

Japanese Engineers Visit Manitowoc Plant

The Manitowoc Portland Cement Co., Manitowoc, Wis., was visited recently by two representatives of the Japanese firm, the Asano Portland Cement Co., Ltd.

The Japanese, Mitsuzo Fujii, chief engineer, and Sunao Takeda, chief chemist, are making a tour of the more important plants of the United States and Canada.

Allan Wins Low Gross in P. C. A. Golf Tournament

W. D. M. Allan, manager of the cement products bureau of the Portland Cement Association, won low gross honors in the seventh annual spring golf tournament of the association, held at the Middlebrook Golf Club course on June 19, with a score of 134 for 27 holes.

Low net honors went to W. E. Hart, manager of the structural and technical bureau, with a score of 140—30.

W. G. Kaiser, assistant manager of the cement products bureau, won the putting prize with a low score of 47 putts in 27 holes.

Joseph H. Neill Is Taken by Death

Joseph H. Neill, 66, connected with the Spokane Portland Cement Company, formerly known as the International, at Irvin, Wash., since 1912, passed away on June 6 at his home there as the result of a heart attack.

He first came to Spokane in 1904 from Wallace, Idaho. He had been associated with the Finch & Campbell mining enterprises for several years. At one time he operated a ranch at Kahlotus. He was born in New Armaugh, Canada.

Mr. Neill is survived by his wife, Mary R., and three brothers, Reginald K. and Samuel, both of Spokane, and William T. in Montana, as well as by two sisters.

Williams Tells Oklahoma Engineers About Cement Manufacture

Merle Williams, superintendent of the Oklahoma Portland Cement Co., was the speaker of the day at the May 28th meeting of the Engineers Club of Oklahoma City.

He discussed the manufacture of portland cement.

"Pay Wagon" Destroyed When Lehigh Barn Burns

The plant's "pay wagon"—a relic of former days—went up in flames when the barn in which it was housed at the Lehigh plant at Mitchell, Ind., was destroyed by fire on May 31.

The blaze was believed to have been due to a cigarette or lighted match dropped by boys. The barn, about 20 by 60 ft., was burned to the ground, only charred framework of half of the building remaining. It was situated a few hundred yards northeast of the office building and had not been used for some time.

Longhorn Plant Visited by Geology Students

Students of economic geology at the University of Texas visited the Republic Portland Cement Co. plant at Longhorn, Texas, recently.

B. F. Affleck Helps to Welcome Delegates to Chicago

B. F. Affleck, Universal Atlas head, was among the members of the welcoming committee for the national conventions held at Chicago in June.

The committee was part of the nonpartisan executive committee.

J. B. John Awarded Holmes Safety Medal

J. B. John, president of the Medusa company, was awarded the Joseph A. Holmes medal during the recent Portland Cement Association meeting for his untiring safety work. Mr. John is the first individual in the cement industry to be accorded this distinction—the highest individual safety honor.

The presentation of this annual award was made by Dan Harrington, chief engineer, U. S. Bureau of Mines, at a special ceremony held at the Biltmore Hotel, New York City.

Boettcher Is Re-Elected Sugar Company Executive

Charles Boettcher, president of the Ideal Cement Co., Denver, Colo., was recently re-elected vice-president of the Great Western Sugar Co.

Republic Portland Exhibit of Longhorn Cement

The Republic Portland Cement Co., San Antonio, Texas, was an exhibitor at a local industrial exposition held during May, with Larry Cox, sales manager, in charge.

A silver and red shield on which appeared the Longhorn cement triangle and a papier mache steer's head with real horns, furnished the background. Piles of cement sacks, filled and empty, completed the exhibit.

Mill Equipment

Du Pont Introduces New Free-Running Powders

A series of explosives of a radically new type, known as "Red Cross Blasting Nos. 2, 3 and 4 F. R.," has been developed by the Explosives department of E. I. du Pont de Nemours & Co., Wilmington, Del.

These so-called free-running powders actually are dynamite of special grades in loose form. They are particularly designed for use in sprung holes and Red Cross No. 2 F. R. is especially adapted for replacing black powder in this work. Field experience is said to have shown that 60 to 75 lb. of the free-running powder will replace 100 lb. of black powder. Nos. 3 and 4 F. R. are well adapted for top loads in certain types of well drill work where they have the advantage over regular cartridge dynamite in that they completely fill the hole because of their free-running characteristics.

While the free-running powders do not have any particular water resistance, experience indicates that they may regularly be used where black powder fails because of moisture conditions.

The most economical way to detonate free-running powders is by means of an electric blasting cap with a primer of at least 40 per cent strength.

Barber-Greene Develops Anti-Friction Conveyor Carrier

A new anti-friction conveyor carrier has just been announced by the Barber-Greene Company, Aurora, Ill.

The roller bearings (Shafer) are of an exclusive design and principle, being self-aligning, and taking thrust as well as radial load, the firm states.

Each size of carrier has but one size roller unit, making these units and component parts interchangeable. The Barber-Greene carrier is made to interchange with any standard carriers for making replacements.

The roller is made of 5½-in. diameter seamless tubing No. 9 gauge thick metal.

The ends are made of pressed steel with the outer roller race inserted under pressure.

The inner tube is 1⅛ in. in diameter with two shoulders, one at each of the ends.

The spindle is ¾ in. diameter, made of selected cold-rolled steel drilled and tapped on each end for grease and Alemite, slotted to fit in the end brackets, and provided with two flats to lock the grease-seal washers.

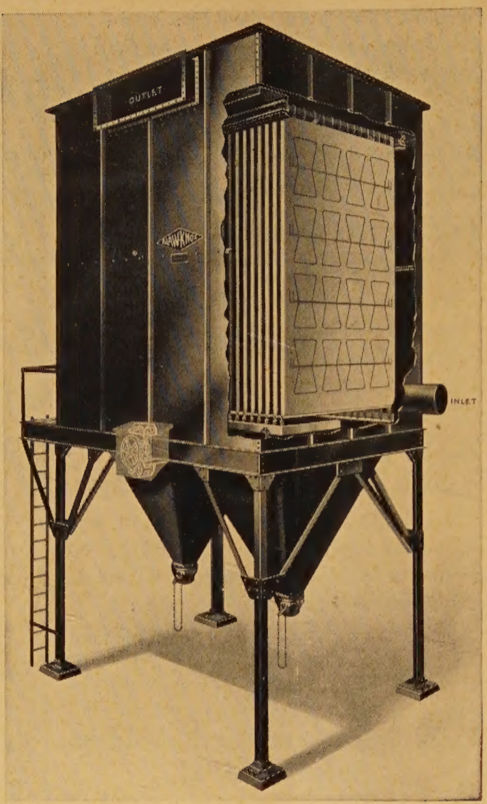
The spindle is also drilled and reamed at each end for taper pins. The bearings are held in by the two labyrinth seal washers, shimmed so as to keep bearings tight. There are three collar spacers between the bearing race and the taper pins.

The entire assembly is filled with grease, filling the bearings as well as the labyrinth seals.

The load rating of each roller bearing is 450 lb. By using a factor of safety of 4½ each roller can carry load of 200 lb. or the entire carrier a load of 600 lb.

The rounded edge of roller protects the belt. The rollers are said to run absolutely true. Each roller is supported by two pressed steel brackets which are bolted to a channel base.

"It Beats as It Cleans"—New Blaw-Knox Dust Collector



The Blaw-Knox framed bag dust collector which "beats as it cleans" is now being manufactured by the Blaw-Knox Co., Pittsburgh, Pa.

A new publication, Catalog No. 1391, and entitled "Positive Dust Collection at Low Cost," describes the equipment. Economy in first cost, operation and maintenance form the basis of its design, it is stated.

Some of the features as listed are the following: A simple wrapping type cloth bag seal employing only two bolts, minimum number of parts per square foot of cloth area, greatest unit of capacity and largest cloth area per square foot of ground occupied, and, unique and effective cleaning mechanism.

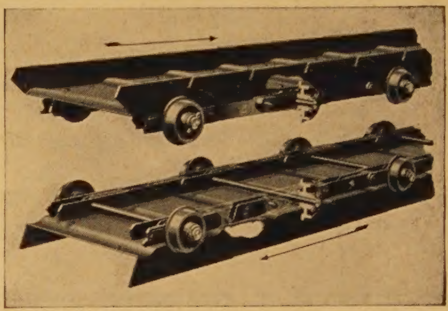
The basic standard unit consists of cotton cloth bags stretched over steel separating and beating frames. But one bolt and nut are used at each end of the frame in sealing. The frame is an all-metal structure built of rigid, small structural members, jig assembled. Hoppers are made of heavy steel construction, sloped at 60 deg. to permit easy and thorough discharge.

New Steel Apron Conveyor Has "Gravity Seal"

The Gravity Seal steel apron conveyor is a new development of the Webster and Weller Manufacturing Companies, Chicago.

The "Gravity Seal" feature is said to be based upon a new method of attaching the conveyor pans to the chains by means of a patented pivot link. It is the operation of this link, in connection with several minor construction features, that causes the pans to overlap so snugly as to eliminate the possibility of leakage of material and yet provides sufficient flexibility to enable the conveyor to travel evenly and without strain around the sprockets, the manufacturer states.

The cross rods, mounted through the center of the chain links, are said to be fitted with hardened bushings of unusual length. All roller parts are described as quickly and easily replaceable without undue interference with operation. Each pair of rollers carries the load of two full pan pitches on both the carrying and return run of the conveyor.



Industrial Literature

Compressor and Pump Publication

Bulletin C-3 issued by the *Fuller Co.*, Catasauqua, Pa., describes its single and two-stage compressors and vacuum pumps.

This is a 16-page publication containing first a general description, followed by details of construction, general dimensions, and typical installation views of the equipment.

Semi-portable air compressors and air receivers are also covered.

Boiler Catalog

A new boiler catalog of 48 fully illustrated pages is now being distributed by the *Foster Wheeler Corp.*, New York, N. Y. This catalog, numbered *Bulletin B-32-3*, describes the several different types of boilers manufactured in the corporation's shops and shows how these boilers are applied to complete steam generating units.

The first portion of this catalog is devoted to a description of sectional header boilers for stationary plants. These boilers are made in both cross drum and longitudinal drum types.

The next part of the catalog is devoted to bent tube boilers for stationary plants. Photographs and drawings show different arrangements of bent tube boilers including three drum, four drum and six drum types.

The third section of the catalog describes boilers of smaller size, including the three drum bent tube low head type and various horizontal fire tube types.

The last part of the catalog is devoted to marine boilers of both water tube and Scotch types. Among the water tube marine boilers described are straight tube units of both staybolted and sectional header construction and bent tube units of the three drum "A" design and the two drum low head type. There is also included a description of extended surface type boilers for the recovery of heat from internal combustion engine exhaust and industrial processes.

New English Publication

Sands, Clays and Minerals is a new periodical being published by *Algernon Lewin Curtis*, Chatteris, England.

The first issue, which made its appearance in April, contains articles on the manufacture of portland cement, and on black diamonds, sands, slate, clay analysis, and ores.

A supplement in colors bears trade marks of British cements.

Budget Booklet

A new, 24-page booklet issued by the Policyholders Service Bureau of the *Metropolitan Life Insurance Co.*, New York City, and entitled *The Manufacturing Expense Budget*, is based on the budgetary practices of many industrial organizations.

Several types of budget used for control of manufacturing expense are described and illustrated, and the complete procedures of four companies are outlined in some detail.

Vibrating Screen Performance

The C. W. Hunt division of the *Gifford-Wood Co.*, Hudson, N. Y., presents in a new brochure a report covering the performance of a Mitchell electric vibrating screen in handling cement clinker.

The data cover a test made at the plant of one of the largest producers in the country, handling crushed clinker coming direct from the mills at a temperature of about 300 deg. F. and which at times carried a small water content.

The results of a comparison made with another screen are shown in graphical form.